REMARKS

Claims 1-12 are pending in this application. By this Amendment, claims 1, 4, 5 and 10 are amended. The amendments introduce no new matter. Applicant previously replied to the outstanding Office Action with an Amendment After Final Rejection filed on July 25, 2006. In reply, the Patent Office mailed an Advisory Action on August 8, 2006 that indicated that the Amendments would not be entered because they were not determined to place the application in better condition fro Appeal. This Amendment therefore responds to the outstanding Office Action , and the further arguments raised in the Advisory Action. A Request for Continued Examination is attached. Reconsideration of the application based on the above amendments and the following remarks is respectfully requested.

The Office Action rejects claims 1-3, 6 and 9-12 under 35 U.S.C. §103(a) over U.S. Patent Application Publication No. 2002/0145142 to Chen et al. ("Chen"); claims 4, 7 and 8 under 35 U.S.C. §103(a) over Chen in view of U.S. Patent No. 5,100,820 to Tsubone ("Tsubone"); and claim 5 under 35 U.S.C. §103(a) over Chen in view of U.S. Patent No. 6,660,539 to Sonderman et al. ("Sonderman"). These rejections are respectfully traversed.

The Office Action, at page 3, concedes that the prior art does not disclose the gate electrode being tapered at a 20° to 80° angle, as is positively recited in claims 1 and 10. The Examiner relies on the assertion that this range is *prima facie* obvious in the absence of a showing that the claimed angles achieve unexpected results unachieved by the feature relative to the prior art angles. However, Applicant's specification describes the benefits of altering the slope angle to achieve a desired effect of thicker deposits of insulating film on the sides of the gate electrode relative to the other surfaces (see paragraph [0082] and Fig. 11). This effect, in combination with other factors, *e.g.* thickness, type, and layer structure of the insulating film, and etching conditions, allows the lightly doped drain (LDD) length to be carefully controlled in unanticipated ways (see paragraph [0019]).

The prior art, as discussed in Chen, does not recognize the problems recited in Applicant's specification of among others (1) forming a substantially perpendicular side on the gate electrode, (2) any difficulty in disposing an interlayer insulating film on the sides of the gate, or (3) forming an insulating layer with a large, uniform thickness of 1μm (see pages 2 and 3). On the contrary, Chen discloses gate electrodes that are rectangular and have thickly-disposed, uniform insulating layers (42) distributed on the sides and horizontal surfaces (see Chen Figs. 2a-c). As such, Chen does not address or provide motivation for the proposed solution to these problems, one of them being tailoring the slope angle, in conjunction with other factors, to achieve a particular insulating layer thickness. Indeed, Chen specifically views a trapezoidal shaped gate as a source of problems, not a solution (see paragraphs [0006] and [0012] of Chen). This inconsistency relates, at least, to the thickness of the first insulating film disclosed in the present specification versus the thickness of the insulating layer (40) in Chen.

The claimed subject matter addresses, among other issues, a problem of making a sidewall on a gate electrode as described in paragraphs [0010] to [0012]. Chen assumes a rectangular gate electrode with thick side walls. Chen discloses a thick sloped insulating layer 40 on the side of the gate electrode 36, and a part of barrier layer 42 being left on that slope after dry etching to the barrier layer 42. These are shown in Figs. 2c and 2d. Next, an insulating layer 40 is wet etched using the remains of barrier layer 42 on the slope as a mask. Accordingly, LDD length is determined by the patterned insulating layer 40 (shown in 2e as number 46).

The subject matter of the pending claims relates to a thin first insulating film and a thick second insulating film on a tapered gate electrode, and a side wall of the gate electrode made by dry etching the two insulating films. The thickness of the second insulating film

helps to determine the LDD length along with the difference of dry etching speed between the first and the second insulating films.

As described above, the method of Chen determines the LDD length from the thickness of an insulating layer 40, and the present subject matter determines the LDD length primarily from the thickness of the second insulating film. In other words, the present subject matter allows for the first insulating film to be relatively thin. The method of Chen does not.

For at least these reasons, the admitted structural differences between the subject matter of the pending claims and the invention disclosed in Chen would not have been obvious based on the teachings of Chen. In other words, the assertion that one of ordinary skill in the art would be motivated to optimize the taper angle to provide for device performance, is misplaced. The taper angle of the present subject matter is optimized, in coordination with numerous other factors, to allow finely tuned amounts of the insulating film to remain in the vicinity of the sides during anisotropic etching, thereby accurately controlling the LDD length in previously unrecognized ways. It is, therefore, not a clearly obvious modification from prior art that fails to recognize the problem or relationship.

The August 8 Advisory Action maintains that having a tapered angle at 20° to 80° is an obvious optimization over the cited trapezoidally-shaped gate because Applicant does not claim insulating film thickness. However, the issue is not whether the insulating film thickness is claimed, but rather, whether tapering provides unanticipated results. Applicant reiterates that, the specification supports a finding that the claimed range provides unexpected results in coordination with numerous factors. Accordingly, the assertion that one of ordinary skill in the art would be motivated to optimize the taper angle to provide for device performance is unreasonable. The prior art does not recognize an advantage to optimizing the taper angle as claimed.

Regarding claim 5, the Office Action's combination of Chen and Sonderman is unreasonable. Specifically, the Office Action, on page 7, asserts that it would have been obvious to one of ordinary skill in the art to employ an endpoint detection process as taught by Sonderman in the method of Chen. However, the cited prior art is not practically combinable. The optical spectroscopic analysis disclosed in Sonderman, which measures outgases of the etching process (see col. 2, lines 18-23), is not compatible with the wet etching disclosed in Chen (see paragraph [0021]). Further, dry etching is applied to an insulating layer in Chen's device, but the material of gate insulating layer 34 is not disclosed. Only if the material of the gate insulating layer 34 and the insulating layer 40 are different would any type of end point detection be effective. Chen does not teach or suggest this. However, even assuming that different materials were used, the disclosed end point detection method would not be compatible with wet etching because there are insufficient outgases. As such, Sonderman cannot reasonably be combined with Chen to make up for any shortfall in Chen with regard to the feature of end point detection as suggested by the Office Action.

In the Advisory Action, the Examiner asserts that because Applicant has not claimed a specific method of detecting an end point, it is submitted that the method of Sonderman makes detecting an endpoint of etching an obvious modification to the method of Chen. However, the motivation to combine references must be established in the prior art. The Office Action fails to provide this motivation. Regardless of whether Applicant claims a specific wet etching process, in order to establish a *prima facie* case of obviousness, specific objective evidence of motivation to combine these references in the manner suggested must be identified and the references must be combinable. Applicant asserts that the Office Action does not establish a *prima facie* case in either regard. It is not clear from the references that any type of endpoint detection would be effective, or, at a minimum, the endpoint detection disclosed in Sonderman would not be effective in Chen.

The Office Action's combination of Chen and Tsubone is equally unreasonable. Specifically, the Office Action asserts, at page 6, that it would have been obvious to use the materials of Tsubone in the method of Chen, particularly silicon oxide as the second insulating layer. This assertion is incorrect because silicon oxide is specifically addressed in Chen, but not recommended for use as the second insulating layer. Chen lists silicon oxide as suitable for the first insulating layer (40), and goes on to list a separate plurality of appropriate substances for use as the second insulating layer (42), or "barrier layer", which will withstand wet etching (see paragraph [0021]). Silicon oxide is not included in the listing of appropriate second insulating layer substances. As such, it would not have been obvious to one of ordinary skill in the art to use silicon oxide as the second insulating layer, or barrier layer, based on the teachings of Chen.

The Advisory Action merely indicates that the deficiency of Chen is remedied by the combination with Tsubone. It does not address or provide support for the finding that it would have been obvious to one of ordinary skill in the art to use silicon oxide as the second insulating layer, when Chen already recognizes that this material is suitable for the first insulating layer but does not recommend it as a second insulating layer. As such, the Office Action fails to establish a *prima facie* case of obviousness for combining these references.

Without conceding the propriety of the above rejections or the conclusions made in the Advisory Action, claims 1 and 10 are amended to clarify the recited features to include a feature wherein the first insulating layer has different composition from the gate-insulating film and the second insulating layer has different composition from the first insulating film.

Without conceding the propriety of the rejections, claim 4 is amended to clarify the feature wherein the method includes forming a sidewall against the tapered gate electrode, the sidewall composed of two different layers of the layered insulating film. The applied references do not teach, nor do they reasonably suggest, such features.

In view of the foregoing, the applied prior art references cannot reasonably be considered to teach, or to have suggested, all of the combinations of features recited in independent claims 1, 4, 5 and 10. Further, claims 2-3, 6-9, 11 and 12 are also neither taught, nor would they have been reasonably suggested, by the applied prior art references for at least their dependence directly or indirectly on independent claims 1 and 10, as well as for the separately patentable subject matter that each of these claims recites.

Accordingly, reconsideration and withdrawal of the prior art rejections of the Office Action are respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-12 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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